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Indian Standard

CODE OF PRACTICE FOR FINISHING OF AUTOMOBILE BODIES

PART II REFINISHING OF PASSENGER CARS

UDC 667·648·8 : 629·114·5 : 006·76

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Price Rs 7·00 Gr 4

November 1981

Indian Standard
CODE OF PRACTICE FOR FINISHING OF AUTOMOBILE BODIES
PART II REFINISHING OF PASSENGER CARS

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Indian Standard

CODE OF PRACTICE FOR FINISHING OF AUTOMOBILE BODIES

PART II REFINISHING OF PASSENGER CARS

0. FOREWORD

0.1 This Indian Standard (Part II) was adopted by the Indian Standards Institution on 15 July 1981, after the draft finalized by the Paints and Allied Products Sectional Committee had been approved by the Chemical Division Council.

0.2 The object of painting is to obtain desired product appearance consistent with maximum durability. The objective is achieved by proper application of organic fillers, putties, primers and enamels or nitrocellulose lacquers on to surfaces which have been cleaned and or chemically treated.

0.3 A large number of material specifications on ready mixed paints, enamels, varnishes, lacquers and allied products have created a need for codes of practice for finishing of automobile bodies, machinery, equipment, etc. Accordingly IS : 8098 (Part I)-1976* was published. This standard (Part II) covers code of practice for refinishing of passenger cars. Code of practice for finishing of other automobile bodies and refinishing would be taken up in due course.

0.4 In the preparation of this standard, substantial assistance has been derived from the information provided by M/s Adisons Paints and Chemicals Ltd, Madras, and the Alkali and Chemical Corporation of India Ltd, Calcutta, which is thankfully acknowledged.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Code of practice for finishing of automobile bodies: Part I Finishing of passenger cars.

†Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part II) prescribes practices to be followed in refinishing (painting) of already painted passenger cars. It covers surface preparation and finishing of cars using synthetic enamels and nitrocellulose lacquers.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 1303-1963*, IS : 6667-1972†, IS : 101-1964‡ and IS : 8098 (Part I)-1976§ shall apply.

3. SURFACE PREPARATION

3.1 Assessment of Surface Conditions — Before taking up any refinishing work, the surface shall be carefully examined. A small area shall be thoroughly cleaned and critically examined for defects, such as cracking, preferably a small area shall be touched up with nitrocellulose finish to observe any lifting or crazing. Only if the paint film is sound repainting shall be done over it; otherwise the paint film shall be completely removed and refinishing done on bare metal.

3.2 Removal of Chromium Beadings — If the area to be painted is crossed or edged, by chromium beadings or linings, they shall be removed first; otherwise, this may be a hindrance for refinishing work. Moreover, this may trap water, paint remover, etc, which may cause trouble at a later date. Welding, bronzing, etc, which may be required to be done while repainting cars involved in accidents, for instance, shall be done first. All tinkering work, like flattening of dents, etc, shall be completed prior to refinishing with paints.

3.3 Surface in Good Condition (Refinish of Local Areas)

3.3.1 *Water Wash* — The area, if in good condition, shall be washed well with water to remove dirt and scum. Addition of a mild detergent to the water is recommended. The area shall be thoroughly rinsed with copious quantity of clean water.

3.3.2 *Water Sanding* — Area to be refinished shall be water-sanded using 400 grit paper. Rubber or felt sanding blocks or power sander may be advantageously used. With smooth even strokes, using plenty of clean

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*Glossary of terms relating to paints (*revised*).

†Glossary of terms used in synthetic resin industry.

‡Methods of test for ready mixed paints and enamels (*second revision*).

§Code of practice for finishing of automobile bodies: Part I Finishing of passenger cars.

water, the hardened paint film surface shall be removed and the imperfections shall be smoothened out. Wipe with suitable solvent to remove grease, wax, etc, and thoroughly dry, blowing out the crevices, etc, with clean compressed air. Hand-sanding is unavoidable for some contours of the cars. Dry-sanding is seldom resorted to, as it raises dust and clogs the paper. Use of solvent in place of water is tough on the hands. Gasoline shall not be used as it is dangerous and leaves oily residue. Apply colour coats as in **4.1.**

3.3.2.1 *Cut-throughs* — The sanding operation given in **3.3.3** may cut-through the paint film to the metal, either because the paint film was thin or a localized rust spot or imperfection was removed. In this case, the edges surrounding the base metal shall be 'feather-edged', that is, finely sanded with 400 or still finer sand paper so that any edge or ridge is not felt by the finger tips.

3.3.3 *Removal of Paint Dust From Sanding* — The entire areas, including metal spots, shall be cleaned with water, dried and solvent wiped. All areas, including crevices are to be dried thoroughly using compressed air, free from oil or by force drying.

3.3.4 *For Replacement Parts* — If the area to be finished is a new bare metal replacement part, it shall also be thoroughly washed with cleaning solvent to remove oil, grease, etc.

3.3.5 *Newly Soldered Areas* — Newly soldered areas shall be washed with ammonia and thoroughly rinsed with water and cleaned with a suitable solvent afterwards.

3.3.6 *Masking* — Careful masking provides clean paint edges and avoids the ragged, sloppy appearance of the repainted areas. This very much contributes to a top class job. Use of various widths of good masking tape, papers and dispensing equipment will save much time and efforts. Use newspapers only over the windows or wheels. Use of newspapers over painted areas is usually poor practice because the ink from the paper may dissolve in paint solvents and cause stains. A narrow width tape shall be used on difficult curved areas because it is easier to manipulate. Wide tape may then be applied over the narrow tape. Water-soluble masking creams are also available which are brushed before spraying and washed off after the paint film is thoroughly dry.

3.3.7 *Tack Ragging the Surface* — After cleaning and drying the metal surface should be wiped with a clean tack rag prior to the application of the primer surfacer. Great care shall be taken to avoid touching the surface with hands, gloves, clothing, etc, which may contaminate the chemically cleaned surface with grease and dirt. Such contamination may seriously harm the final finish.

3.3.8 *Application of Primer/Primer Surfacer* — After the areas are dried thoroughly, primer/primer surfacer shall be applied to the bare metal surfaces and allowed to dry for the recommended period before the application of the subsequent coats.

3.3.9 *Application of Putty* — Spot putty can be applied to make up surface defects on the damaged area. Putty should be applied over the primer surfacer before it is sanded. After drying the putty should be wet sanded and dried thoroughly along with the primer surfacer using 320 grade grit paper. All putty areas should be sealed with primer surfacer before the application of the finish.

3.3.10 *Application of Finish* — The finish may either be applied locally or over the whole surface depending upon the extent of rectification required.

3.3.10.1 *Spot repairs* — Local rectification shall be done by spraying the whole panel. However, spot spray may be carried out over existing nitrocellulose finish by using a special technique. Existing stoving synthetic or air-drying synthetic finish should always be rectified panel wise.

3.4 Surface in Bad Condition (Complete Refinish)

3.4.1 *Removal of Old Finish* — If the entire paint system is to be removed to the bare metal, because of the poor condition of the existing paint system, any one of the following procedures may be adopted.

3.4.1.1 *By sanding* — The damaged paint film may be removed by water sanding with 180 rough paper fist and then with 400 or still finer paper to smooth out the scratches. Power sanding with 24 grinding disc followed by 50 grit disc is also recommended.

3.4.1.2 *By strong alkali* — The existing paint system may be removed by using strong alkali solutions. But great care shall be taken while handling the solution as it is injurious to the skin and attacks zinc and aluminium parts fitted in the cars.

3.4.1.3 *Paint removers* — Solvent type paint removers may also be used. These usually contain wax which forms the top layer and seals in the solvents under its surface. The solvents attack and lift the paint film. Correct application and thorough removal of the material after use is essential as any trace of wax left unremoved shall hinder the final finish.

3.4.1.4 *By sand blasting* — Sand blasting is excellent for larger areas. It may be used on any metal. It results in a perfect cleaning job.

3.4.2 *Clean-up of Sanding Operations* — After any of the operations (*see* **3.4.1.1** to **3.4.1.4**) using 50 grit disc or steel-wool, any remaining rust spot or surface defects shall be removed.

3.4.3 *Washing* — Wash the entire area with suitable solvent to remove all the wax, grease or dirt, residues from paint removal operation. If a chemical type remover is used, a thorough waterwash shall precede the solvent wash. Solvent wash is very important if solvent wax type paint removers have been used.

3.4.4 *Anti-Rust Treatment* — The bare metal shall be treated with a phosphoric acid based rust preventive material after diluting as directed by the manufacturer. Wipe off after 2 to 3 minutes while still wet with a clean dry cloth. If the surface dries up, re-wet with more of the material and then wipe dry with a clean cloth again.

3.4.5 *Drying* — Blow out cracks and mouldings and wipe off any spatters.

3.4.6 *Application of Primer/Primer Surfacer* — Apply a coat of primer/primer surfacer within 30 minutes to prevent the formation of rust on the chemically cleaned surface. Take great care to avoid touching the surface with hands or clothing.

3.4.7 *Putty Application*

3.4.7.1 Putty may be applied over the primer surfacer before the surfacer is sanded. The surfacer and putty are then sanded in the same operation. It may also be applied over the primer. Apply putty in thickness not greater than that necessary to smooth out the rough spots. Putty is not a substitute for metal work which calls for the hammer, the grinder and the file. The excess putty shall be sanded off. It is better to make 2 or 3 thin applications of putty allowing adequate drying time between coats than to make one heavy application. The drying time for putty may vary with the type of putty and thickness applied.

3.4.7.2 After the putty has thoroughly dried, water sand the undercoats with 360 grit paper or finer. A final wet sanding with 400 grit paper or finer is recommended. Any cut-through to the metal shall be re-sprayed with surfacer and scuff-sanded after drying.

3.4.7.3 All putty areas shall be sealed by the application of primer surfacer. This shall be dried and scuffed before the application of the finish coat.

3.4.7.4 Wipe surface with tack-rag before applying colour coats.

3.5 *Finish* — The finish shall be sprayed all over. Normally 3 coats are required to get the desired film built.

3.5.1 Details on the different finish systems are given in Table 1.

3.6 General

3.6.1 *Safety Rules for the Paintshop* — Provide good ventilation system to remove fumes. Do not permit smoking in and around the spray areas. Place fire extinguishers and equipment in handy spots. Never drive a car in or out of the spray booth; push it by hand. Never use temporary electrical connections. Be sure ground wires are intact to avoid static electricity. Regularly check all electrically driven equipment. Keep the areas including the floors clean. Dispose of dirty range daily without fail before quitting time.

3.6.2 *Hints for Good Workmanship*

3.6.2.1 Thoroughly stir or shake the can of paint. A power-driven shaker is very helpful. The stirring or agitation results in a uniform mixture of pigment, binder and thinners.

3.6.2.2 It is very important to stir undercoats well because of their heavier pigment content.

3.6.2.3 Reduce with the right type and correct amount of thinner as recommended by the manufacturer. Economizing on cheap thinner may spoil the finish. Always keep the paint and thinner at the room temperature.

3.6.2.4 Always add thinner slowly to the paint and stir constantly. Adding thinner quickly may result in seedy looking paint jobs.

3.6.2.5 Strain the reduced topcoats through a fine mesh metal or suitable strainer. A 100 mesh screen (100 parallel wires per 2·5 cm) is good. Use a coarse screen (50 mesh) for all undercoats.

3.6.2.6 Do not inter-mix the same type of products, like the primer, primer surfacer, colour coats, etc, of different brands. They may not be compatible.

3.6.2.7 Never apply a synthetic primer over a lacquer, when the topcoat also is going to be a lacquer. This sand-witching of the primer will result in ‘lifting’. They may only be lightly dry scuffed.

3.6.3 *Colour Accuracy*

3.6.3.1 Colour change in the paint film may be caused by the weather. Continuous exposure to the ultra voilet rays of strong sunlight has greatest effect on the colour.

3.6.3.2 Matching an old finish that has drastically changed in colour, is usually difficult. It is easier to refinish the car completely. To test a finish for colour accuracy, spray the new colour over the same base colour that will finally be used. Allow it to dry, then compare it against a polished section. Spraying over the same base colour is particularly important for aluminium pigmented colours and for many new semi-opaque colours. The base coat has a marked effect on the final appearance.

3.6.3.3 Before actually using the paint, make sure to stir the fresh can of paint thoroughly and reduce with the correct amount and type of thinner or reducer. Make sure to pay close attention to the spraying technique. Neglect of any of these factors may result in an off colour.

3.6.3.4 Spraying in different ways, wet, dry, heavy and thin shall result in distinct colour variation. Most colours shall show some variation because of differences in spraying or reduction. This is specially so in case of low hiding and indescent colours.

3.6.4 *Rubbing and Polishing*

3.6.4.1 If rubbing is done too soon before all traces of solvents have evaporated from the film, hazing or dulling may result. The rubbing/polishing shall be done after 48 hours of application of nitrocellulose lacquer. Rubbing may be done either by hand or by wheel-buffer. If a hand rubbing compound is to be used, apply the compound sparingly to a rubbing ball made of a clean, cheese cloth. Rub with straight back and forth motions in one direction until the desired smoothness is obtained. After obtaining the desired surface, polish to a high lustre with another clean cloth-preferably cotton flannel. In case of the material being painted with synthetic enamel, polishing shall be done after 7 days of drying.

3.6.4.2 Wheel-polishing compounds should be applied with a brush to the colour film. As the wheel is applied, the compound shall spread evenly and rapidly produce a bright, glossy finish.

TABLE 1 PROCESS OF REFINISHING OF PASSENGER CARS

(*Clause* 3.5.1)

PROCESS DETAIL (1)	MATERIAL (2)	SPECIFICATION REQUIREMENT (3)
a) *In case of Welding*		
i) If the surface is to be welded the area shall be thoroughly cleaned with mineral turpentine and a suitable welding sealer or primer applied.	Any suitable welding sealer or welding primer may be used.	Specification to be drafted. At present proprietory materials are being used. The primer shall prevent corrosion starting from the welded joints after welding and also the parts shall be capable of being welded after the application of the primer.
ii) *Derusting* — Apply a suitable derusting composition with steel wool and remove the rust, if any, from both inside and outside and wipe with cotton rags and blow compressed air all over the area inside and outside.	Any suitable derusting composition based on phosphoric acid may be used.	Specification to be drafted. At present proprietory materials are being used. After application wipe off, the area shall be completely free from rust and shall not show any stickiness.
b) *On Brazed Joints*		
i) Apply epoxy stopper putty on brazed joints.	Two - component epoxy stopper putty may be used.	Specification to be drafted. This material shall make the brazed joints completely waterproof and shall give complete protection against corrosion.
c) *Primer/Primer Surfacer*		
One coat of synthetic airdrying primer is sprayed at a viscosity of 20 to 22 seconds in IS Cup No. 4 at 30°C to get a dry film thickness of 25 microns. Airdry for 16 h and apply 2 coats of nitrocellulose surfacer by spraying with 15 minutes interval between coats. The surfacer is thinned to 18 to 20 seconds in IS Cup No. 4 at 30°C with the recommended thinner. It is allowed to dry for 1 h for putty application.	Proprietory materials are being used.	Specification to be drafted. It dries to touch in 30 minutes. It takes nitrocellulose putty in 30 minutes and nitrocellulose primer surfacer in one hour.
OR		

Two coats of synthetic airdrying primer surfacer is sprayed at a viscosity of 22 to 24 seconds in IS Cup No. 4 at 30°C to get a dry film build of 50 microns. This is airdried for 4 to 6 h before putty application.	Proprietary materials are being used.	Specification to be drafted.
c-1 *For spot touch-up*		
One coat of nitrocellulose *touch-up primer* may be sprayed at a viscosity of *18 to 20* seconds in IS Cup No. 4 at 30°C to get a film thickness of 20 microns. Then *3 coats* of nitrocellulose primer surfacer are sprayed as indicated above and allowed to airdry for 4 h.	Proprietary materials are being used. Nitrocellulose primer surfacer.	Specification to be drafted. A primer based on nitrocellulose containing anticorrosive pigments may be used. Touch airdry period is about 15 minutes and hard dry period is 4 hours. Conforming to IS : 6126-1971*.
d) *Putty*		
Nitrocellulose putty is lightly applied over nitrocellulose primer surfacer synthetic primer surfacer wherever necessary and allowed to airdry for 4 h.	Proprietary materials are being used.	Specification to be drafted.
e) *Surfacer After Putty Flatting*		
The primer surfacer/putty is wet-sanded by hand or machine and then washed with water inside and outside and air is blown to remove water and dried at elevated temperature or with cloth. Exposed putty areas and portions where bare metal is exposed during sanding are touched up with nitrocellulose or synthetic primer surfacer airdried and dry-scuffed with emery paper No. 400. The area is tack-ragged to remove loose *particles of* dust and dirt.	Proprietary materials are being used.	Specification to be drafted. This shall be a non-sanding, fast drying type of primer, which when dried forms a non-absorbent smooth surface with good adhesion on bare metal and capable of protecting it from corrosion. This shall hold good for lacquer and stoving enamels.

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*Specification for nitrocellulose surfacer.

TABLE 1 PROCESS OF REFINISHING OF PASSENGER CARS — *Contd*

Process Detail (1)	Material (2)	Specification Requirement (3)
f) *Application of Finish*		
Nitrocellulose based touch-up finishes are used for touch-up on the areas using the appropriate thinner recommended by the supplier; 2 coats are to be sprayed with 5 minutes interval between the coats. After 5 minutes, a mist coat of the recommended thinner shall be sprayed on the dry spray area to ensure proper merging of the coats. A flash off time of 10 to 15 minutes is allowed and then the touched portions are airdried overnight or force dried for 15 to 20 minutes with infra red lamps. Touch up of synthetic stoving enamels shall be done edge-to-edge, that is, if the damage is on the door panel, the whole door panel shall be finished with the finish and dried as before.	Proprietory materials are being used at present.	This product shall be such that it gives a finish comparable to stoving enamels.
	Lacquer.	Conforming to IS : 5691-1970*.
	Thinner.	Conforming to IS : 5667-1970†.
In case of complete refinish either nitrocellulose finish or synthetic airdrying finish can be used. Three coats of nitrocellulose finish followed by a mist coat are recommended. Synthetic airdrying finish should be thinned to 20 to 22 seconds in IS Cup No. 4 with recommended thinner and two coats should be sprayed with 10 minutes flash between coats.		

g) *Polishing*

The refinished touch-up areas are polished with suitable liquid polish with mechanical buffing with soft mop. This polishing operation is to be carreid out to remove the dry spray and proper merging of the touched up areas. Polishing is preceded by rubbing with abrasive rubbing compound. For complete refinishing it is desirable to carry out the burnishing and polishing operation after a few days.	Automobile polish, liquid.	Conforming to IS : 7982-1976‡.

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* Specification for lacquer, cellulose, pigmented, finishing, glossy.
† Specification for thinner for cellulose nitrate based paints and lacquers.
‡ Specification for automobile polish, liquid.

4. ADDITIONAL REQUIREMENTS

4.1 Brush all the upholstery. If a leatherette upholstery has been used, brighten it up with recommended leatherette cleaner. Wash the rubber or composition floor mats with water and detergents with a soft cloth, dust and dash, steering wheel and mouldings. For old tyres, whether white side or black walls rubber dressing will make them look new. Sometimes a good washing with water is sufficient. For chrome strips and bumper, a commercial type chrome cleaner or steel wool and soap will do, provided the chrome has not completely rusted away.

5. ECONOMY IN REFINISHING JOB

5.1 Avoiding high air pressure and overspray and maintaining a low paint inventory at all times, will result in considerable economy in refinishing jobs.